

REMARKS

Claims 1 to 16 are all the claims pending in the application, prior to the present Amendment.

The Examiner has not acknowledged applicant's claim for foreign priority, or receipt of the certified copies of the priority documents. Applicant requests the Examiner to make such acknowledgements.

The Examiner has maintained the Restriction Requirement and has made it final.

Although the Examiner has made the Restriction Requirement final, applicant submits that if the product claims are allowed, the Examiner should rejoin the process claims.

Claims 1-7 have been rejected under the second paragraph of 35 U.S.C. § 112 as indefinite.

The Examiner sets forth a number of reasons for this rejection beginning at page 2 of the Office Action.

In general, the Examiner asserts that a number of the terms in claims 1, 2, 6 and 7 lack antecedent basis. Applicant has amended claims 1, 6 and 7 so that all terms in these claims have clear antecedent basis. Claim 2 has been canceled.

In addition, the Examiner asserts that the term "to a depth of 30%" in claims 1 and 2 is unclear because the claims do not recite what the 30% is modifying.

In response, applicant has amended claim 1 to state the surface layer region is a region that extends from the support surface to a distance from the support surface of 30% toward the midpoint in a cross section of the support. Thus, the 30% is modifying the distance from the

support surface to the midpoint in a cross section of the support. Applicants refer the Examiner to the description in the specification at page 8, line 12 to page 9, line 11 for support for the term "midpoint." Applicant submits that one of ordinary skill in the art would understand the meaning of the "30%" value in view of the descriptions in the specification.

In view of the above, applicant submits that the claims comply with the requirements of the second paragraph of 35 U.S.C. § 112 and, accordingly, request withdrawal of this rejection.

Claims 1-3 and 5-7 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 5,164,354 to Aldridge et al.

Applicant submits that Aldridge et al do not disclose or render obvious the subject matter of the present claims and, accordingly, request withdrawal of this rejection.

The present invention as set forth in claim 1 as amended above is directed to a supported catalyst comprising a support having a support surface, and supported on the support at least one member selected from the group consisting of heteropolyacids and heteropolyacid salts, wherein 90 mass% or more of the heteropolyacid and/or heteropolyacid salt is present in a surface layer region that extends from the support surface to a distance from the support surface of 30% toward the midpoint in a cross section of the support.

Thus, applicant has amended claim 1 to incorporate subject matter from claim 2 to recite that 90 mass % or more of the heteropolyacid and/or heteropolyacid salt is present in the surface layer region. Claim 2 has been canceled.

In essence, the Examiner states that Aldridge et al disclose that the heteropolyacid or salt thereof is deposited and forms a layer on the outer surface of the support. The Examiner then

concludes that the heteropolyacid or salt thereof “is substantially present to a depth of 30% from the surface.” The Examiner particularly refers to Example I of Aldridge et al.

The Examiner has asserted that since the heteropolyacid or salt thereof forms a layer on the surface of the support in Aldridge et al, substantially all or 100 mass% thereof is present in a depth of 30% from the surface.

Applicant does not agree with the Examiner’s analysis of Aldridge et al.

Aldridge et al disclose a supported catalyst comprised of heteropolyacid salts and/or complexes supported on an inorganic support material, such as alumina. In Aldridge et al, the heteropolyacid salts and/or complexes are uniformly distributed on the support, that is, the catalytic elements are homogenously distributed in the support. Such a uniform distribution does not satisfy the recitations of claim 1.

As described in Example I of Aldridge et al, to which the Examiner has referred, a heteropolyacid is dissolved in demineralized water to prepare an impregnation solution. In this case, the solution has a low viscosity and, therefore, exhibits a high penetration rate, so that the solution easily penetrates into the inside of the support.

In Example I of Aldridge et al, in fact, the pore volume of the employed alumina support is calculated as $31.61 \text{ g} \times 0.68 \text{ cc/g} = 21.55 \text{ cc}$, while the volume of the impregnation solution used during the fluid impregnation is $28.89 \text{ g} \div 1.3066 \text{ g/cc} = 21.50 \text{ cc}$. Thus, the volume of the impregnation solution used in Example I of Aldridge et al corresponds to almost 100% of the pore volume of the employed alumina support.

Therefore, it is clear that in Aldridge et al, the heteropolyacid salt is uniformly dispersed in the almost entire volume of the support.

The operation of dissolving in water in Example I of Aldridge et al to almost 100% the pore volume corresponds to Comparative Example 1 of the present application, where the catalytic component was dissolved in an amount of water corresponding to 100 volume % of the liquid absorption amount of the support. As disclosed in Comparative Example 1 of the present specification, the catalytic component was homogeneously (uniformly) supported in the entire support. Accordingly applicant submits that the present invention is clearly distinguished from Aldridge et al.

In order to show that a uniformly distributed catalyst such as in Aldridge et al does not satisfy the recitations of claim 1, applicant sets forth the following calculations based on the assumption that the support is in the form of a sphere, and that the catalyst is uniformly distributed throughout the sphere.

Assuming that the sphere has a radius of 10 mm, the entire volume of the sphere would be $4,188.8 \text{ mm}^3$.

A region that extends from the support surface to a distance from the support surface of 30% of the radius would form an inner sphere having a radius of 7 mm. The volume of an inner sphere having a radius of 7 mm is 1436 mm^3 . Therefore, the volume of the region that extends from the support surface to a distance from the support surface of 30% would be 2752 mm^3 , which is about 66% of the entire volume of the sphere. Thus, for a uniform distribution, the surface layer region that extends to a distance of 30% from the support surface comprises about 66% of the entire volume of the sphere. Assuming that the amount of catalyst in this region

corresponds to the volume % of the sphere in this region, a uniformly distributed catalyst would result in a supported catalyst wherein the catalyst is present in an amount of 66% in the surface layer region that extends to a distance of 30% from the support surface.

As can be seen from the above calculations, in a uniformly distributed support, at most 66% of the acid would be distributed in the surface layer region.

In view of the above, applicant submits that Aldridge et al do not disclose or render obvious the subject matter of the present claims and, accordingly, requests withdrawal of this rejection.

Claim 4 has been rejected under 35 U.S.C. §103(a) as obvious over Aldridge et al in view of U.S. Patent 5,405,996 to Suzuki et al.

Since claim 4 depends from claim 1, applicant submits that claim 4 is patentable for the same reasons as set forth above for claim 1.

Accordingly, applicant requests withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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